EFFECT OF DIETARY SUPPLEMENTATION OF Selenum and Moringa oleifera leaves on growth performance of pre-pubertal Kundhi buffalo calves


ABSTRACT

INTRODUCTION: Organic selenium is a form of the essential trace element, which is required various biological functions in humans and animals. Selenium plays a vital role in maintaining overall health, including thiol and selenol function, thyrometabolism, DNA synthesis, and antioxidant defense systems (Fairweather-Tait et al., 2011). Organic selenium refers to selenium that is covalently bound to carbon within organic compounds, such as selenomethionine and selenocysteine. These organic forms are generally more bioavailable and less toxic than inorganic forms, such as selenite and selenate (Schrauzer, 2000). Selenomethionine, for example, is a natural selenium compound and is absorbed and incorporated into proteins in place of methionine, thereby enhancing the bioavailability of selenium (Rayman, 2000).

Organic selenium is commonly found in food sources such as Brazil nuts, whole grains, fish, and meat. Selenium content in plant-based foods can vary widely, depending on the selenium concentration in the soil where they are grown. Selenium is a vital micronutrient that plays a crucial role to reproductive health of ruminants and buffalo. It is involved in various physiological processes, including the metabolism of thyroid hormone, immune function and antioxidant defence systems. Selenium deficiency or suboptimal levels can lead to reproductive disorders and decreased fertility in both male and female animals. It is involved in various physiological processes, including the metabolism of thyroid hormone, immune function and antioxidant defence systems. Selenium deficiency or suboptimal levels can lead to reproductive disorders and decreased fertility in both male and female animals.

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The Kundhi buffalo, a unique and robust breed of water buffalo (Bubalus bubalis), is native to the Sindh province in Pakistan. This breed is well-adapted to the local environment and known for its excellent milk production, meat quality, and draught power. There is a growing need to develop strategies that focus on the sustainable conservation and genetic improvement of this breed to preserve its valuable traits for future generations. Twelve young bull calves belonging to elite Kundhi buffaloes (observed phenotypically) were obtained from progressive farmers based on their parent's performance records. The bull calves, aged approximately 10-15 months, were initially weighed (ranges from 150 to 200 kg) and randomly divided into three groups, namely C, S, and M, each group were comprising 04 animals. Group C was designated as the control group and fed basal diet only, while Group S, followed by M (0.33 ng/ml) in comparison to C (0.208 ng/ml) group. The monthly gains of animals were recorded significantly (P<0.05) higher (1.65 cm) in the S, than to M (1.21 cm) and that of control (0.40 cm) group calves.

Keywords: Kundhi buffalo, selenium, Moringa oleifera, scrotal circumference, testosterone.
bulls therefore should be grown out early and well, avoiding, as far as possible damage to the testicular tissue from any cause. The age at which puberty begins depends on many factors, but size for the breed seems to be the main controlling factor (Korejo et al., 2019).

**OBJECTIVES:** The objectives of this study were to investigate the growth performance and the testosterone level of pre pubertal Kundhi buffalo bull calves under the oral supplement with Selenium and *M. oleifera* leaves.

**MATERIALS AND METHODS:** Body weight: Body weight was taken early in the morning of every bull calf before feeding. According to Schaeffer’s formula (Measuring Tape Method) can be measured with following equation.

\[ W = \frac{L}{4} \times 20^2 \]

W represents the body weight in pounds, L signifies the length of the animal in centimetres, The measurement was taken from the shoulder’s starting point to the pin bone, and G denotes the chest girth of the animal in centimeters.

**Body conformation:** The body conformation of the buffalo bull calves was taken by checking the height at wither (from wither straight to ground), length (from point of shoulder to pin bone), heart girth (circumference of chest).

**Scrotal circumference:** The scrotal circumference of buffalo bull calves was measured. To determine the scrotal circumference, carefully pull the testis down towards the lower part of the scrotum by looping a rubber band around its neck. Then, using a measuring tape, the circumference of the scrotum can be measured in centimeters.

**Testosterone level:** Early in the morning using a 10-cc syringe, Blood samples were obtained from each calf by collecting them from the jugular vein, and placed into a blood-collecting tube. To continue the process, the tubes were brought to the lab. All of the Kundhi buffalo bull calves had their blood taken on day one and again at the conclusion of the experiment. The blood samples were then separated from the serum by centrifuging them at 3000 rpm for 20 mins. Subsequently, the collected blood samples were stored in sterilized glass vials at a temperature of -20 °C. These samples were preserved for later use with kits designed to measure the levels of serum testosterone. Serum-labelled testosterone was added to the standard samples and the unidentified samples to be incubated in tubes covered with antibodies. The liquid inside the tubes was aspirated after incubation, and a gamma counter was used to measure the bound radioactivity. Interpolation was used for figuring out the testosterone levels in unidentified samples by utilizing an equivalence curve prepared using six standards.

**Statistical analysis:** The data were processed on different statistical analysis utilizing computer program GraphPad Prism v.5 to determine the correlation coefficient and ANOVA-II between the treated groups.

**RESULTS:** Body weight (Kg/month): Results on the body weight of Kundhi buffalo bull calves fed on selenium and *M. oleifera* leaves are mentioned in figure 1.

Data indicates that significantly (P<0.05) increased body weight gains (14.05 kg/month) were recorded in Kundhi buffalo bull calves fed on selenium as compared to group M (11.67 Kg/month) fed on *Moringa oleifera* leaves. Lower body weight gains (9.75 Kg/month) were noted in Kundhi buffalo bull calves of the control in comparison to the animals of S and M groups. Correlation analysis between the body weight and age was performed for all groups in individual bulls. Results showed that there was positive correlation among the body weight versus age of Kundhi buffalo bull calves. The body weight of Kundhi buffalo bull calves were increased more in selenium and *Moringa oleifera* leaves feeding group compared to that of control (figure 1).

The **age, body length, heart girth, and height:** The body conformation, including the heart girth, length, and height of Kundhi buffalo bull calves versus age of the animals were described in control, selenium and *Moringa oleifera* leaves feeding groups are mentioned in the table 1.

<table>
<thead>
<tr>
<th>Age (month)</th>
<th>Heart girth (cm)</th>
<th>Body length (cm)</th>
<th>Height (cm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>5.43</td>
<td>79.65</td>
<td>43.23</td>
</tr>
<tr>
<td>C2</td>
<td>11.53</td>
<td>130.93</td>
<td>100.55</td>
</tr>
<tr>
<td>C3</td>
<td>17.65</td>
<td>182.83</td>
<td>158.99</td>
</tr>
<tr>
<td>S1</td>
<td>5.43</td>
<td>84.45</td>
<td>48.65</td>
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<tr>
<td>M1</td>
<td>11.53</td>
<td>130.56</td>
<td>100.56</td>
</tr>
<tr>
<td>M2</td>
<td>17.65</td>
<td>182.83</td>
<td>158.99</td>
</tr>
<tr>
<td>M3</td>
<td>23.76</td>
<td>194.13</td>
<td>171.23</td>
</tr>
</tbody>
</table>

Table 1: The average heart girth, body length, and height of the individual Kundhi buffalo bull calves in control, selenium and *Moringa oleifera* leaves within the range of different age levels (Mean ± SEM). Abbreviations C1 – C4 (control bulls), S1 – S4 (bulls fed selenium), M1 – M4 (bulls fed *M. oleifera* leaves).

The data table presents the measurements of 12 animals, categorized into three groups: C (C1-C4, S1-S4), and M (M1-M4). For each animal, four variables were measured: Age (in months), Heart girth (in cm), Body length (in cm), and Height (in cm). Each variable is presented in the table with its corresponding mean and standard error of the mean (SEM). The animals in group C have ages ranging from 11 to 13 months and show relatively smaller heart girth, length, and height values compared to the other two groups. Animals in group S have ages between 10.5 and 13 months and generally exhibit larger heart girth, length, and height values. Lastly, animals in group M have ages between 10.5 and 13 months and present heart girth, length, and height measurements that fall between the values of the other two groups. The findings of this study related to the heart girth, body length, and height measurements of male buffalo calves are presented in figure 2.

**Figure 1:** The average monthly gains of body weight (Kg/month) of Kundhi buffalo bull calves supplemented with selenium and *M. oleifera* leaves in comparison to control subjects (A). Coefficient of correlation between age and body weight of a bull from control group (B), Selenium (C) and *M. Oleifera* (D).

**Figure 2:** The average monthly gains of heart girth, body length and height of Kundhi buffalo bull calves in control animals and supplemented with Selenium and *M. oleifera* leaves. Our data indicated significant positive correlation (P<0.05) between heart girth (11.2 cm), body length (8.99 cm) and height (8.94 cm) in Kundhi buffalo bull calves fed on selenium followed by (8.23, 4.89 and 6.39 cm) bull calves fed on *Moringa oleifera* leaves compared to the control animals (4.74, 3.58 and 3.27 cm) respectively.

**Testosterone level:** The testosterone level of the Kundhi buffalo bull calves fed on selenium and *Moringa oleifera* leaves compared to control subjects were recorded before and after the treatment in different group of animals and are mentioned in figure 3.
The results of present study concluded that feeding Kundhi buffalo bull calves with selenium and *M. oleifera* leaves under the supplementation of selenium in their ration. *M. oleifera* effects of intake on the development and reproductive abilities of West African Dwarf goats (Wato et al., 2017) and *M. oleifera* leaf supplementation, further supporting our results. This discrepancy might be due to differences in the specific nutritional needs and metabolism of buffalo bull calves compared to other species, or perhaps due to synergistic effects of selenium and *M. oleifera* leaf supplements together. Further research would be needed to investigate these possibilities. The findings of the research suggested that the Kundhi buffalo bull calves were given selenium and *M. oleifera* leaves had substantially greater heart girth, length, and height as compared to the control group. The study found a significantly higher level of testosterone in the group fed with selenium compared to those fed with *M. oleifera* leaves and the control group. The results of current study indicated that feeding of *M. oleifera* leaves to male Kundhi buffalo calves could have the potential to improve the testicular size and sperm production. Therefore, the increase in scrotal circumference suggests that selenium and *M. oleifera* supplementation could potentially enhance reproductive capacity in buffalo bull calves. Findings of current study have indicated that feeding of *M. oleifera* leaves resulted in significantly higher monthly gains of the scrotal circumference compared to the control group. Similarly, higher scrotal circumferences were reported in Nili-Ravi buffalo calves under the supplementation of selenium in their ration. *M. oleifera* leaves on the scrotal circumference and testicular weight in the goats that were given *M. oleifera* leaf supplements. The significance of selenium in maintaining reproductive health has been thoroughly studied in past research. Selenium supplementation in rams led to a significant increase in scrotal circumference (Ziaei, 2015), aligning with our findings. This study also suggested that the selenium-supplemented group had a higher sperm count, indicating a potential improvement in fertility.

**CONCLUSIONS:** The results of present study concluded that feeding Kundhi buffalo bull calves with selenium and *M. oleifera* leaves were improved body weight, heart girth, length, height, and scrotal circumference, as well as increase their testosterone levels. The outcomes suggest that administering selenium and *M. oleifera* leaves to male Kundhi buffalo calves could have the potential to enhance their growth and reproductive abilities. Therefore, it can be inferred that these supplements may be beneficial for the management of Kundhi buffalo breeding. These findings have significant implications for livestock management practices, as improving animal growth and reproductive performance can lead to increased efficiency and productivity in animal production systems.

**CONFLICT OF INTEREST:** Authors have no conflict of interest.

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